LISTING OF CLAIMS

Claims 1-43 are cancelled

44. (new) A method for gauging water and non-electrically conductive light or dense non-aqueous liquid contaminants, LNAPL or DNAPL respectively, that can eliminate cross-contamination between wells comprising the steps of:

(a) installing an elongated sensor extending down the entire length of a well, said elongated sensor having

(a-1) a conductive liquid circuit, including a first resistive network extending down the entire length of the well, for sensing electrically conductive liquids only; together with

(a-2) a hydrostatic circuit that responds to the actuation pressure of conductive and non-conductive liquids, said hydrostatic sensing circuit including a second resistive network extending down the entire length of the well; together with

(a-3) a well depth sensing circuit, including a third resistive network extending down the entire length of the well;

(b) after completion of installation of the elongated sensor in accordance with step (a), measuring the electrical resistance of the first resistive network of said conductive liquid circuit from the top of the well to produce a conductive liquid depth signal indicating the depth of the electrically conductive liquid in the well;

(c) after completion of installation in accordance with step (a), measuring the electrical resistance of the second resistive network of said hydrostatic circuit from the top of the well to produce all liquid depth signal indicating the depth of all liquids including said LNAPL in the well if present;

(d) after completion of installation in accordance with step (a), comparing the measured resistance of the hydrostatic circuit with the measured resistance of the conductive liquid circuit and recording any difference therebetween indicative of the thickness of the LNAPL layer;

(e) after completion of installation in accordance with step (a), measuring the resistance of the conductive liquid circuit from the bottom of the well and recording this measured resistance from the bottom of the well as indicative of the thickness of said DNAPL;

(f) after completion of installation in accordance with step (a), measuring the resistance of said third resistive network indicating the length of said well and subtracting the measured resistance recorded in accordance with step (e) from the resistance of said third resistive network to record the depth of a DNAPL layer if present;

(g) after completion of installation in accordance with step (a), subtracting the measured resistance of the conductive liquid circuit from the measured resistance of said third restive network to record the height of the conductive liquid column.

45. (new) The method of claim 44 including recording the volume of each different type of liquid that may be present by multiplying the thickness of each liquid layer by a factor including a well casing inside diameter.

46. (new) The method of claim 44 wherein data produced by execution of the steps of claim 44 are recorded by a portable digital processor temporarily connected to the top of the well.

47. (new) The method of claim 45 wherein data produced by execution of the steps of claim 44 are recorded by a portable digital processor temporarily connected to the top of the well.

48. (new) The method of claim 44 wherein the installation step (a) involves permanently installing said elongated sensor within said well.

49. (new) The method of claim 45 wherein the installation step (a) involves permanently installing said elongated sensor within said well.

50. (new) The method of claim 46 wherein the installation step (a) involves permanently installing said elongated sensor within said well.

51. (new) The method of claim 47 wherein the installation step (a) involves permanently installing said elongated sensor within said well.

52. (new) Apparatus for gauging water and non-electrically conductive light or dense non-aqueous liquid contaminants, LNAPL or DNAPL respectively, that can eliminate cross-contamination between wells comprising:

(a) means for positioning an elongated sensor extending down the entire length of a well before measurements are taken, said elongated sensor having

(a-1) a conductive liquid circuit, including a first resistive network of serially connected resistors extending down the entire length of the well, for sensing electrically conductive liquids only; along with

(a-2) a hydrostatic circuit that responds to the actuation pressure of conductive and non-conductive liquids, said hydrostatic circuit including a second resistive network of serially connected resistors extending down the entire length of the well; along with

(a-3) a well depth sensing circuit, including a third resistive network of serially connected resistors extending down the entire length of the well;

(b) means for measuring the electrical resistance of the first resistive network of said conductive liquid circuit from the top of the well to produce a conductive liquid depth signal indicating the depth of the conductive liquid in the well;

(c) means for measuring the electrical resistance of the second resistive network of said hydrostatic circuit from the top of the well to produce an all liquid depth signal indicating the depth of all liquids including said LNAPL in the well if present;

(d) means for comparing the measured resistance of the hydrostatic circuit with the measured resistance of the conductive liquid and recording any difference therebetween indicative of the thickness of the LNAPL layer;

(e) means for measuring the resistance of the conductive liquid circuit from the bottom of the well and if greater than zero, recording this measured resistance from the bottom of the well as indicative of the thickness of said DNAPL;

(f) means for measuring the resistance of said third resistive network indicating the length of said well and subtracting the measured resistance recorded by the measuring means of paragraph (e) from the resistance of said third resistive network to record the depth of an DNAPL layer if present;

(g) means for subtracting the measured resistance of the conductive liquid circuit from the measured resistance of said third restive network to record the height of the conductive liquid column.

53. (new) The apparatus of claim 52 including means for recording data indicative of the volume of each different type of liquid that may be present by multiplying thickness of each liquid layer by a factor including a well casing inside diameter.

54. (new) The apparatus of claim 52 wherein a portable digital processor records data produced by the apparatus of claim 52.

55. (new) The apparatus of claim 53 wherein a portable digital processor records data produced by the apparatus of claim 52.

56. (new) The apparatus of claim 52 including means for permanently positioning said elongated sensor along the entire length of said well.

57. (new) The apparatus of claim 53 including means for permanently positioning said elongated sensor along the entire length of said well.

58. (new) The apparatus of claim 54 including means for permanently positioning said elongated sensor along the entire length of said well.

59. (new) The apparatus of claim 55 including means for permanently positioning said elongated sensor along the entire length of said well.

60. (new) Apparatus employing an elongated sensor having a length that can extend along the entire length of a well for sensing electrically conductive water and non-electrically conductive non-aqueous liquid contaminants within said well comprising:

(a) a conductive liquid circuit, including a first resistive network of serially connected resistors extending down the entire length of said well, for sensing electrically conductive liquids only;

(b) a hydrostatic circuit that responds to the actuation pressure of conductive and non-conductive liquids, said hydrostatic sensing circuit including a second resistive network of serially connected resistors extending down the entire length of said well; and

(a-3) a well depth sensing circuit, including a third resistive network of serially connected resistors extending down the entire length of said well.

61. (new) Apparatus of claim 60 wherein said elongated sensor comprises a tape coupled to tape support means extending along the length of the well for retaining said tape in place within said well between well inspections, thereby eliminating lowering sensors into said well that may require subsequent decontamination procedures.

62. (new) The apparatus of claim 60 wherein said elongated sensor is in the form of a thin film tape.

63. (new) Apparatus of claim 60 wherein a conductive liquid sensing means is coupled to each resistor of said first resistive network for effectively removing a resistor from said first resistive network should a conductive liquid contact said conductive liquid sensing means.

64. (new) Apparatus of claim 61 wherein a conductive liquid sensing means is coupled to each resistor of said first resistive network for

effectively removing a resistor from said first resistive network should a conductive liquid contact said conductive liquid sensing means.

65. (new) Apparatus of claim 62 wherein a conductive liquid sensing means is coupled to each resistor of said first resistive network for effectively removing a resistor from said first resistive network should a conductive liquid contact said conductive liquid sensing means.

66. (new) Apparatus of claim 63 wherein each conductive liquid sensing means includes an associated tiny conductive contact positioned within said tape, thereby enabling very precise liquid level measurements.

67. (new) Apparatus of claim 64 wherein each conductive liquid sensing means includes an associated tiny conductive contact positioned within said tape, thereby enabling very precise liquid level measurements.

68. (new) Apparatus of claim 65 wherein each conductive liquid sensing means includes an associated tiny conductive contact positioned within said tape, thereby enabling very precise liquid level measurements.

69. (new) Apparatus for measuring non-electrically conductive light or dense non-aqueous liquid contaminants, LNAPL or DNAPL respectively, that can eliminate cross-contamination between wells comprising:

(a) means for supporting an elongated sensor extending down the entire length of a well before measurements are taken and having a conductive liquid circuit, including a first resistive network of serially connected resistors extending down the entire length of the well, for sensing electrically conductive liquids only, and a hydrostatic circuit that responds to the actuation pressure of conductive and non-conductive liquids, said hydrostatic circuit including a second resistive network of serially connected resistors extending down the entire length of the well;

(b) a portable digital processor having the following components:

(b-1) means for measuring the electrical resistance of th first resistive network of said conductive liquid circuit from the top of the well to produce a conductive liquid depth signal indicating the depth of the conductive liquid in the well; together with

(b-2) means for measuring the electrical resistance of the second resistive network of said hydrostatic circuit from the top of the well to produce an all liquid depth signal indicating the depth of all liquids including said LNAPL in the well if present; together with

(b-3) means for comparing the measured resistance of the hydrostatic circuit with the measured resistance of the conductive liquid circuit and recording any difference therebetween indicative of the thickness of the LNAPL layer; together with

(b-4) measuring means for measuring the resistance of the conductive liquid circuit from the bottom of the well and if greater than zero, recording this measured resistance from the bottom of the well as indicative of the thickness of said DNAPL layer.

70. (new) Apparatus for measuring non-electrically conductive light or dense non-aqueous liquid contaminants, LNAPL or DNAPL respectively, that can eliminate cross-contamination between wells comprising:

(a) means for supporting an elongated sensor extending down the entire length of a well before measurements are taken and having:

(a-1) a conductive liquid circuit, including a first resistive network extending down the entire length of the well, for sensing electrically conductive liquids only, together with

(a-2) a hydrostatic circuit that responds to the actuation pressure of conductive and non-conductive liquids, said hydrostatic circuit including a second resistive network extending down the entire length of the well;

(b) means for measuring the electrical resistance of the first resistive network of said conductive liquid circuit from the top of the well to produce a conductive liquid depth signal indicating the depth of the conductive liquid in the well;

(c) means for measuring the electrical resistance of the second resistive network of said hydrostatic circuit from the top of the well to produce an all liquid depth signal indicating the depth of all liquids including said LNAPL in the well if present;

(d) means for comparing the measured resistance of the hydrostatic circuit with the measured resistance of the conductive liquid circuit and recording any difference therebetween indicative of the thickness of the LNAPL layer;

(e) measuring means for measuring the resistance of the conductive liquid circuit from the bottom of the well and if greater than zero, recording this measured resistance from the bottom of the well as indicative of the thickness of said DNAPL layer.